TOSHIBA Bi-CMOS Integrated Circuit Silicon Monolithic

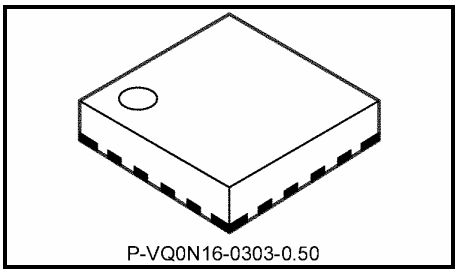
TB2140FTG

Stereo Headphone Amplifier

The TB2140FTG is a stereo headphone amplifier IC.

It is an unnecessary output coupling capacitor and a power amplifier common is GND.

Moreover, an external capacitor is 2.2 μF or less, so that it is suitable for a small portable set.



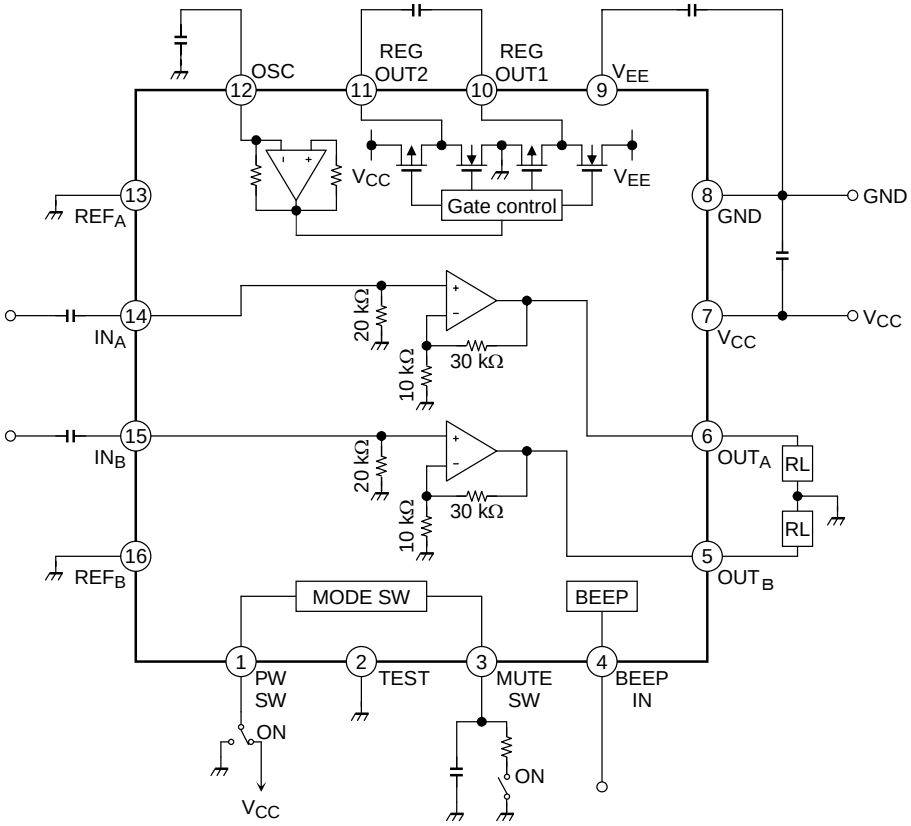
Weight: 0.01 g (typ.)

Marking: B26

Features

- Output coupling capacitor less and a power amplifier common is GND.
- An external capacitor is 2.2 μF or less.
- Voltage gain: G_V = 12dB (typ.)
- Built-in beep function.
- Built-in power switch
- Built-in power mute function
- Operating supply voltage range: Ta = 25°C
  V_{CC} (opr) = 2.0 to 3.6 V

Block Diagram

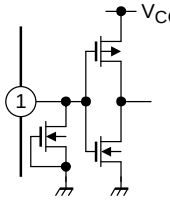
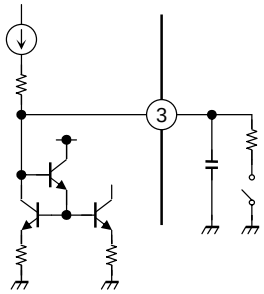
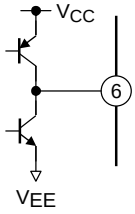
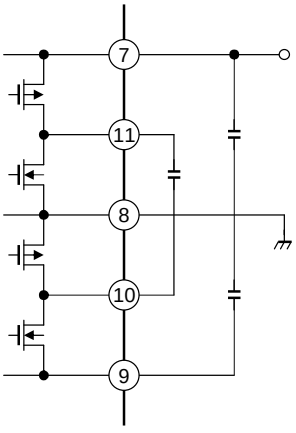


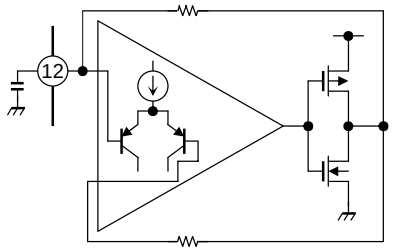
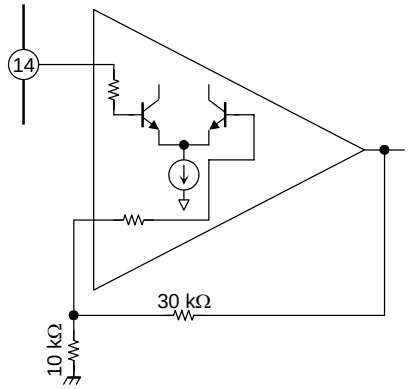
Some of the functional blocks, circuits, or constants in the block diagram may be omitted or simplified for explanatory purpose.

Pin Descriptions

The equivalent circuit diagrams maybe simplified or some parts of them may be omitted for explanatory purpose.

Pin voltage: typical pin voltage for test circuit when no signal is applied.
V_{CC} = 3 V, Ta = 25°C

Pin No.	Name	Function	Internal Circuit	Pin Voltage (V)
1	PW SW	Power switch IC ON: H level IC OFF: L level		3.0
4	BEEP IN	Beep signal input If the beep function is not used, this pin is connected to GND		—
2	TEST	TEST This pin should be connected to GND.	—	0
3	MUTE SW	Mute switch Mute ON: L level Mute OFF: OPEN A external resistance of this pin should do below 33 kΩ. When it value is bigger than 33 kΩ, a switch circuit malfunctions.		1.3
5	OUTB	Outputs from power amplifier		0
6	OUTA			
7	VCC	—		3.0
8	GND	—		0
9	VEE	Negative voltage supply		–3.0
10	REG OUT1	Outputs from switching regulator circuit		—
11	REG OUT2			—

Pin No. and Name		Function	Internal Circuit	Pin Voltage (V)
12	OSC	Oscillation circuit		—
13	REFA	Reference of power amplifier	—	0
16	REFB			
14	INA	Inputs to power amplifier		0
15	INB			

Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	3.6	V
Output current	$I_{O\ (peak)}$	100	mA
Power dissipation	P_D (Note)	275	mW
Operating temperature	T_{opr}	−25 to 75	°C
Storage temperature	T_{stg}	−55 to 150	°C

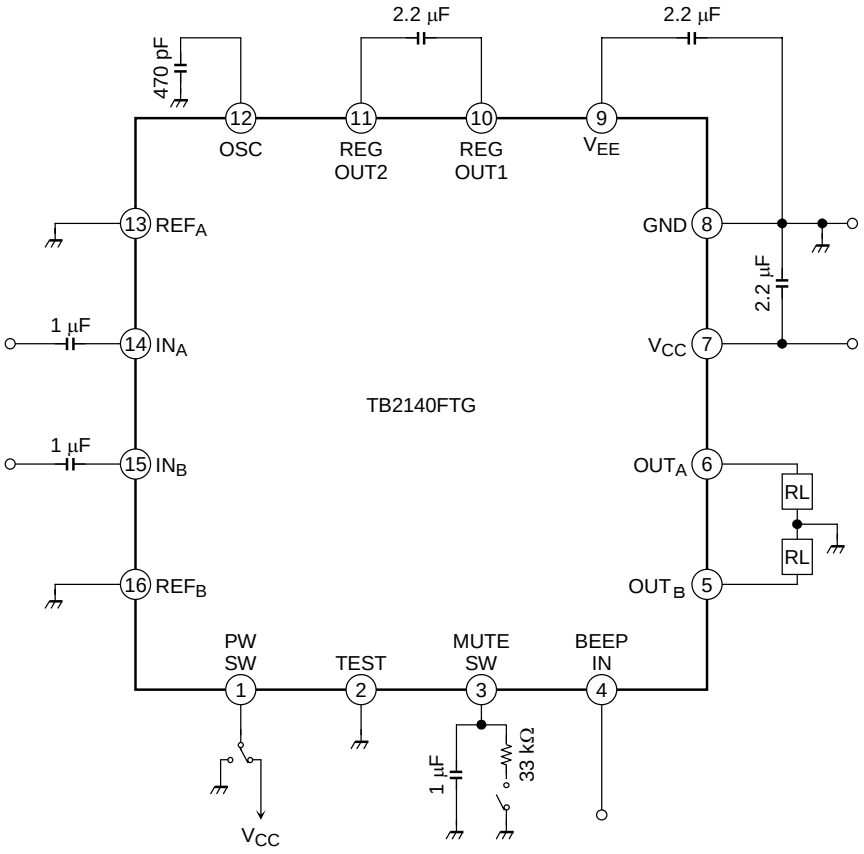
Note: Derated by 2.2 mW/°C above Ta = 25°C

The absolute maximum ratings of a semiconductor device are a set of specified parameter values, which must not be exceeded during operation, even for an instant.
If any of these rating would be exceeded during operation, the device electrical characteristics may be irreparably altered and the reliability and lifetime of the device can no longer be guaranteed.
Moreover, these operations with exceeded ratings may cause break down, damage and/or degradation to any other equipment.
Applications using the device should be designed such that each absolute maximum rating will never be exceeded in any operating conditions.
Before using, creating and/or producing designs, refer to and comply with the precautions and conditions set forth in this documents.

Electrical Characteristics
(Unless otherwise specified, V_{CC} = 3 V, R_g = 600 Ω, R_L = 32 Ω, f = 1 kHz, Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Quiescent supply current	ICCQ1	IC OFF mode	—	—	5	uA
	ICCQ2	Power mute mode	—	0.35	0.55	mA
	ICCQ3	No signal mode	—	1.3	2.8	mA
Power supply current during drive	ICC	0.1 mW*32 Ω/2 ch	—	4.0	—	mA
Switching regulator oscillation frequency	fosc		70	90	110	kHz
Voltage gain	Gv	V_O = −20dBV	10.5	12	13.5	dB
Channel balance	CB	V_O = −20dBV	1.5	0	+1.5	dB
Output power	Po	THD = 10%	22	28	—	mW
Total harmonic distortion	THD	P_O = 1 mW	—	0.1	0.3	%
Output noise voltage	Vno	R_g = 600 Ω, IHF-A	—	−100	−92	dBV
Cross talk	CT	V_O = −20dBV	−50	−60	—	dB
Ripple rejection ratio	RR	f_r = 100 Hz	−45	−60	—	dB
Muting attenuation	ATT	V_O = −20dBV	−90	−110	—	dB
Beep signal output level	Vo (BEEP)		−55	−50	−45	dBV
Power on voltage	V1 (ON)		V_{CC} × 0.8	—	V_{CC}	V
Power off voltage	V1 (OFF)		0	—	V_{CC} × 0.2	V
Power mute on voltage	V3 (ON)	Monitor : Switch voltage	0	—	0.15	V

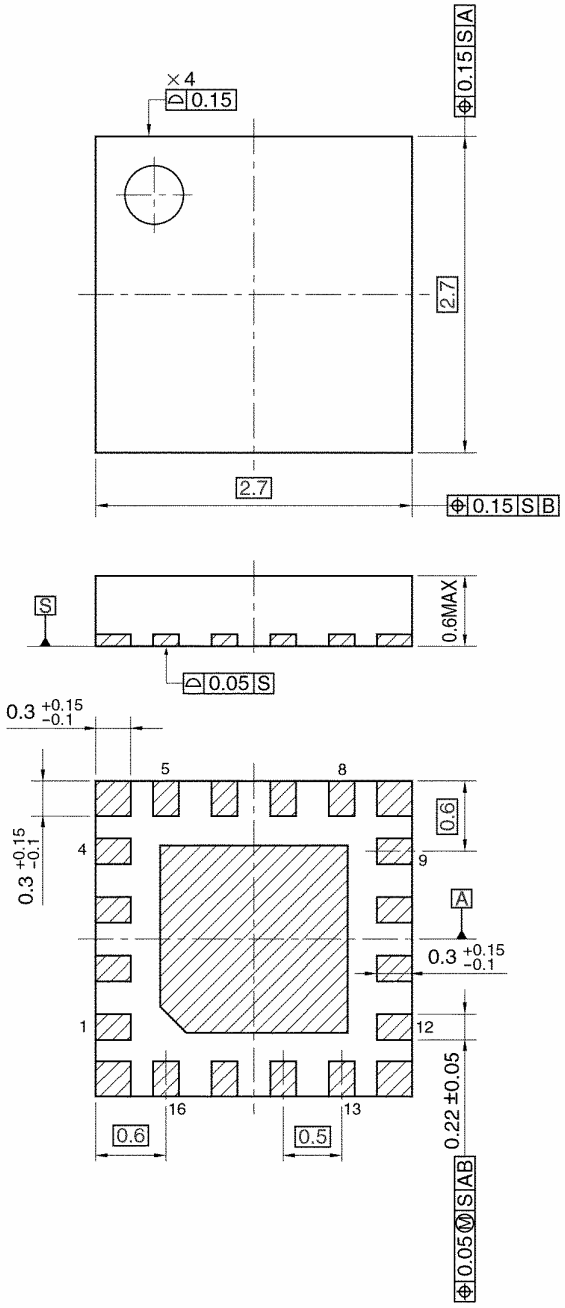
Test Circuit



Components in the test circuits are only used to obtain and confirm the device characteristics.
These components and circuits do not warrant to prevent the application equipment from malfunction or failure.

Package Dimensions

P-VQ0N16-0303-0.50 Unit: mm



Note: The die length by the projective technique from a package top face prescribes the part of a package side-face part, and it is made into the 0.15 maximum.
The flux of solder cream should use RMA type or RA type.

Weight: 0.01 g (typ.)

RESTRICTIONS ON PRODUCT USE

060116EBA

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About solderability, following conditions were confirmed

- Solderability

  (1) Use of Sn-37Pb solder Bath
  - solder bath temperature = 230°C
  - dipping time = 5 seconds
  - the number of times = once
  - use of R-type flux

  (2) Use of Sn-3.0Ag-0.5Cu solder Bath
  - solder bath temperature = 245°C
  - dipping time = 5 seconds
  - the number of times = once
  - use of R-type flux